CLAIMS:

This listing of claims will replace all prior versions and listings of claims in this application:

What is claimed is:

1 to 24(cancelled).

25(newly presented). A model based controller for control of a full industrial process comprising a plurality of process steps, at least one of which involves a neural network, said model based controller comprising:

a development environment comprising at least one recipe for an industrial process, each said recipe comprising a plurality of process steps at least one of which comprises a neural network, and which process steps are defined by a plurality of models, with each said model corresponding to at least one process step within said recipe;

an execution environment in operative communication with said development environment, and which execution environment comprises an execution platform capable of executing a recipe from said development environment;

a coordination environment in operative communication with said execution environment and, through said execution environment, with said development environment, and which coordination environment coordinates information flow from said execution environment, and through said execution environment, said development environment and said model;

a control level in operative communication with said coordination environment and, through said coordination environment, with said execution environment and said development environment, and in operative communication with at least one controller which is capable of controlling at least one component in the execution of at least one process step as defined by said model and communicated by said coordination environment;

and wherein, said controller sends a control command corresponding to a step defined by said model communicated to said controller from said model within said development environment through said execution environment and through said coordination environment, to said component, and said component sends a component information element to said controller, which component information element is communicated through said coordination environment to said execution environment in which the performance of said process step may be varied in accordance with said component information element;

said model based controller further comprising a system for controlling at least one neural network, comprising:

a plurality of models, wherein said plurality includes at least one modeled component, at least one recipe model, and at least one optimizer model, and wherein each of said at least one modeled components is corresponded to each of the at least one devices for control and is communicatively connected to at least one of said at least one recipe models, and wherein each of said at least one optimizer models monitors at least one of said at least one recipes and at least one of said at east one modeled components;

an executor resident above said plurality that coordinates at least one of the modeled components with at least one of the recipes to provide for virtual control, and that monitors said at least one optimizer for neural input to modify the virtual control; and

at least one interface that communicatively connects the executor to each of the at least one devices for conrol.

26(newly presented). The model based controller of Claim 25, wherein the coordination of said model with said controller comprises a data flow between said model and said controller.

27(newly presented). The model based controller of Claim 25, wherein said controller is adapted to control a plurality of components.

28(newly presented). The model based controller of Claim 25, wherein said development environment further comprises a recipe generator communicatively coupled to said plurality of models, and comprising means to add or amend recipes.

29(newly presented). The model based controller of Claim 25, further comprising at least one server being communicatively coupled to said coordination environment.

30(newly presented). The model based controller of Claim 25, further comprising at least one server being communicatively coupled to said development environment and to said plurality of models.

31(newly presented). The model based controller of Claim 25, wherein said coordination environment comprises a server.

32(newly presented). The model based controller of Claim 25, wherein said execution environment further comprises computing resources for real-time control of an execution mode.

33(newly presented). The model based controller of Claim 32, wherein said execution environment further comprises means to display the execution of said process.

34(newly presented). The model based controller of Claim 32, wherein said execution environment further comprises means to monitor and control said process.

35(newly presented). The model based controller of Claim 25, wherein said at least one controller comprises a programmable logic controller.

36(newly presented). The model based controller of Claim 35, wherein said coordination environment further comprises code for enabling communication.

37(newly presented). The model based controller of Claim 36, wherein said coordination environment further comprises code for modifying at least one recipe associated with said controller.

38(newly presented). The model based controller of Claim 37, wherein said code is responsive to at least one of said models.

39(newly presented). The model based controller of Claim 25, wherein said execution environment further comprises at least one interface adapted to present information indicative of one of said models and said at least one component to a user.

40(newly presented). The model based controller of Claim 39, further comprising code for enabling said user to employ said interface to modify said model.

41(newly presented). A method of control of a full industrial process comprising a plurality of process steps, said model based controller comprising:

a development environment comprising at least one recipe for an industrial process, each said recipe comprising a plurality of process steps, and which process steps are defined by a plurality of models, with each said model corresponding to at least one process step within said recipe;

an execution environment in operative communication with said development environment, and which execution environment comprises an execution platform capable of executing a recipe from said development environment;

a coordination environment in operative communication with said execution environment and, through said execution environment, with said development environment, and which coordination environment coordinates information flow from said execution environment, and through said execution environment, said development environment and said model;

a control level in operative communication with said coordination environment and, through said coordination environment, with said execution environment and said development environment, and in operative communication with at least one controller which is capable of controlling at least one component in the execution of at least one process step as defined by said model and communicated by said coordination environment;

and wherein, said controller sends a control command corresponding to a step defined by said model communicated to said controller from said model within said development environment through said execution environment and through said coordination environment, to said component, and said component sends a component information element to said controller, which component information element is communicated through said coordination environment to said execution environment in which the performance of said process step may be varied in accordance with said component information element;

said model based controller further comprising a system for controlling at least one neural network, comprising:

a plurality of models, wherein said plurality includes at least one modeled component, at least one recipe model, and at least one optimizer model, and wherein each of said at least one modeled components is corresponded to each of the at least one devices for control and is communicatively connected to at least one of said at least one recipe models, and wherein each of said at least

one optimizer models monitors at least one of said at least one recipes and at least one of said at east one modeled components;

an executor resident above said plurality that coordinates at least one of the modeled components with at least one of the recipes to provide for virtual control, and that monitors said at least one optimizer for neural input to modify the virtual control; and

at least one interface that communicatively connects the executor to each of the at least one devices for control;

which method comprises the steps of:

selecting a recipe associated with a process having at least one step;

generating a model associated with each process step within said process;

issuing at least one control command associated with each said model, which control command is communicated by said at least one controller to said at least one component;

sending, by said at least one component, responsively to said at least one control command, of at least one component information element to said at least one controller; and

communicatively coordinating each said model with the at least one controller, wherein said at least one control command is generated in accordance with the at least one process step, and wherein the at least one process step is varied in accordance with said at least one component information element.

42(newly presented). A computer-readable medium, carrying thereon at least one sequence of instructions for controlling an industrial process, wherein the execution of said at least one sequence of instructions by at least one processor in communication with at least one controller and at least one component creates a model based controller comprising:

a development environment comprising at least one recipe for an industrial process, each said process comprising a plurality of process steps, and which process steps are defined by a plurality of models, with each said model corresponding to at least one process step within said recipe;

an execution environment in operative communication with said development environment, and which execution environment comprises an execution platform capable of executing a recipe from said development environment;

a coordination environment in operative communication with said execution environment and, through said execution environment, with said development environment, and which coordination environment coordinates information flow from said execution environment, and through said execution environment, said development environment and said model;

a control level in operative communication with said coordination environment and, through said coordination environment, with said execution environment and said development environment, and in operative communication with at least one controller which is capable of controlling at least one component in the execution of at least one operation as defined by said model and communicated by said coordination environment;

and wherein, said controller sends a control command corresponding to an operation defined by said model communicated to said controller from said model within said development environment through said execution environment and through said coordination environment, to said component, and said component sends a component information element to said controller, which component information element is communicated through said coordination environment to said execution environment in which the performance of said process step may be varied in accordance with said component information element

said model based controller further comprising a system for controlling at least one neural network, comprising:

a plurality of models, wherein said plurality includes at least one modeled component, at least one recipe model, and at least one optimizer model, and wherein each of said at least one modeled components is corresponded to each of the at least one devices for control and is communicatively connected to at least one of said at least one recipe models, and wherein each of said at least one optimizer models monitors at least one of said at least one recipes and at least one of said at east one modeled components;

an executor resident above said plurality that coordinates at least one of the modeled components with at least one of the recipes to provide for virtual control, and that monitors said at least one optimizer for neural input to modify the virtual control; and

at least one interface that communicatively connects the executor to each of the at least one devices for control;

and permits the at least one processor to perform the steps of:

selecting a recipe associated with a process having at least one operation;

generating a model associated with each process step within said process;

issuing at least one control command associated with each said model, which control command is communicated by said at least one controller to said at least one component;

sending, by said at least one component, responsively to said at least one control command, of at least one component information element to said at least one controller; and

communicatively coordinating each said model with the at least one controller, wherein said at least one control command is generated in accordance with the at least one process step, and wherein the at least one process step is varied in accordance with said at least one component information element.